Light Pressure in Pawan Upadhyay's Pressure–Curvature Law of Gravity (PPC Law of Gravity)

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Light is commonly described as massless, yet it can push objects, move spacecraft, and exert measurable force. This phenomenon is known as light pressure or radiation pressure. While well established in physics, light pressure is often treated separately from gravity. In Pawan Upadhyay's Pressure–Curvature Law of Gravity (PPC Law), light pressure fits naturally into a broader physical picture in which pressure arises from energy density and produces real physical effects.

What Is Light Pressure?

Light consists of photons. Photons have zero rest mass, but they carry energy and momentum. When photons strike a surface, are absorbed, or reflected, momentum is transferred. This transfer of momentum produces a force. When the force is distributed over an area, it appears as pressure.
Light pressure has been experimentally confirmed and is responsible for phenomena such as solar sails, radiation-driven dust motion, and laser manipulation of small particles.

Pressure Without Mass

A central idea in the PPC framework is that pressure does not require mass. It requires energy density. Photons do not have rest mass, but they possess energy density. This energy density naturally produces pressure.
Light pressure therefore directly supports a key principle of PPC gravity: energy density alone is sufficient to generate pressure and force.

Light Pressure as a Surface Force

In PPC terms, light pressure acts primarily as a surface force. When light interacts with matter, the force depends on the intensity of radiation, the area of the surface, and whether the light is absorbed or reflected.
This explains why solar sails accelerate away from the Sun, why comet tails point outward, and why thin reflective materials respond strongly to radiation. Unlike gravity, light pressure usually does not act as a long-range field force. It acts locally where light meets matter.

Light and Spacetime Curvature

Light does not strongly curve spacetime in ordinary conditions, but it is not independent of spacetime geometry. In General Relativity, light follows null geodesics, meaning its path is determined by spacetime curvature.
In PPC gravity, gravitational pressure shapes spacetime curvature, and curvature guides the motion of light. In this sense, light behaves as a curvature-guided wave. Light remains an electromagnetic wave, not a gravitational wave, but its propagation reveals the geometry of spacetime.

The Fastest Possible Speed

In PPC gravity, light travels at the fastest possible speed allowed by spacetime. Because photons are massless, they move along the most direct causal paths. No signal, force, or pressure–curvature disturbance can propagate faster than light.
This same universal speed applies to pressure–curvature waves associated with gravity. Strong curvature can bend paths and slow clocks, but it cannot increase the fundamental speed limit.
Light Pressure and Gravitational Pressure
Although both arise from energy density, light pressure and gravitational pressure are fundamentally different.
Light pressure acts mainly through surface interaction and momentum transfer. Gravitational pressure acts as a field force that curves spacetime and governs motion. Light pressure produces mechanical effects, while gravitational pressure produces geometry.
This distinction clarifies why light can exert force without behaving like mass.

Why This Matters

Understanding light pressure within the PPC framework unifies electromagnetic and gravitational phenomena conceptually. It avoids outdated ideas such as relativistic mass and highlights pressure as a universal physical agent. Gravity is not an exception, but a special case where pressure shapes spacetime itself.

Further Research and Open Access

All related research papers, notes, and supporting documents are available openly on my Archive.org profile and Pawan Upadhyay Dataverse - Harvard Dataverse:

https://archive.org/details/@pawan_upadhyay

These materials are shared for academic reference, transparency, and open scientific discussion.

Final Thought

In Pawan Upadhyay’s Pressure–Curvature Law of Gravity, light pressure demonstrates that pressure is a fundamental consequence of energy density, while gravity represents the case where pressure governs the curvature of spacetime itself.

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